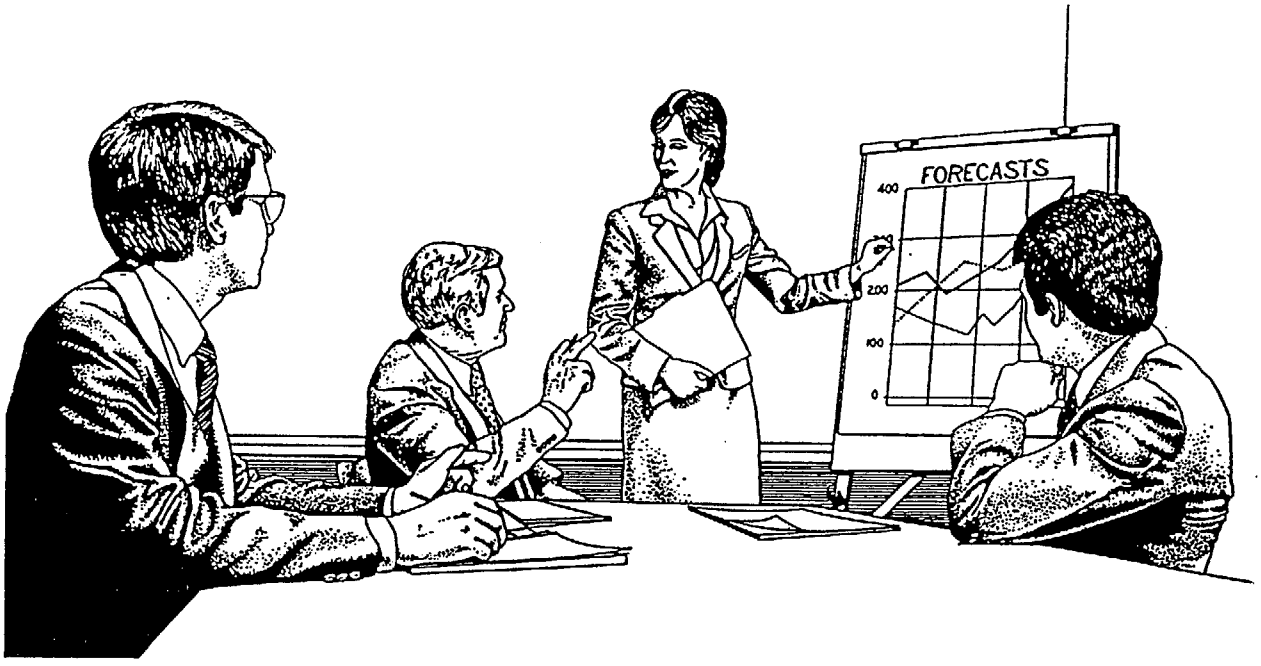
AVIATION DEMAND FORECASTS



Chapter Two
AVIATION DEMAND FORECASTS

Springerville Municipal Airport

The proper planning of a facility of any type must begin with a definition of the needs that the facility can reasonably be expected to serve over the specified planning period. At Springerville Municipal Airport, this involves the development of a set of forecasts that may best define the potential of future aviation demand. Forecasts of aviation activity at the airport can be used as a basis for determining the types and sizes of facilities required to meet the aviation needs of the service area through the year 2015.

The primary objective of a forecasting effort is to define the magnitude of change that can be expected over time. Because of the cyclical nature of the economy, it is virtually impossible to predict with certainty aviation activity on a year-to-year basis over an extended period of time. A growth curve can be established, however, to predict the overall long-term growth potential.

While a single line is often used to express the anticipated growth, it is important to remember that actual growth may fluctuate above and below this line. For this reason, graphical depictions of aviation forecasts in this chapter will include a "forecast envelope," serving as a reminder that actual growth in activity seldom follows a simple straight line or mathematical curve.

It is also important to recognize that forecasts serve only as guidelines, and planning must remain flexible to respond to unforeseen events. Aviation activity at an airport is influenced by many external factors, as well as by the facilities and

services available. Few industries have seen as dramatic a change as the aviation industry since the first powered flight. Major technological advancements, and regulatory and economic actions, have resulted in erratic growth patterns placing significant impacts upon aviation activity.

Recent regulatory actions and economic factors also have significantly impacted activity patterns at many airports. The following sections attempt to define historical aviation trends and discuss other influences which may affect the future use of the Springerville Municipal Airport. The results of these analyses are presented as the preferred forecasts for the facility.

FORECASTING PROCEDURES

The systematic development of aviation forecasts involves both analytical and judgmental processes. A series of mathematical relationships are tested to establish statistical logic and rationale for projected growth. The judgement of the forecast analyst, based upon professional experience and knowledge of the situation, is important to the final determination of the preferred forecast.

The analysis begins with the assessment of historical trends as data is collected and sorted on a variety of aviation indicators at the local, regional and national level. Data on aviation related factors, such as aircraft operations, based and registered aircraft, and fuel sales, were obtained for the analyses. Similarly, socioeconomic factors, such as population, income and employment, were also analyzed to determine the effect that they had on local aviation activity. The identification and comparison of the relationships between these various indicators provides the initial step in the development of realistic forecasts of aviation demand.

As part of the analytical process, trend lines, based upon historical relationships, are extended into the future. Trend lines developed through the use of a variety of techniques are called projections.

FORECASTING METHODOLOGY

The most reliable approach to estimating aviation demand is to use a number of analytical models, and then to compare the results. The most common techniques used include: trend line projection, correlation analysis, regression analysis, and market share analysis.

Trend line projection is probably the simplest and most familiar of the forecasting techniques. By fitting classical growth curves to historical demand data, then extending them into the future, a basic trend line projection is produced. A basic assumption of this technique is that outside factors will affect future aviation demand in much the same manner as they have in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

Correlation analysis provides a measure of the direct relationship between two separate sets of historical data. Should there be a reasonable correlation between the data sets, further evaluation using regression analysis may be employed. Correlation is normally expressed in terms of R where the closer the R-value is to one (1), the higher the degree of confidence the forecaster has that the variables are closely related to one another. An R-value of less

than 0.85 would be considered a poor correlation.

In *regression analysis*, values for the aviation demand element in question (the dependent variable) are projected on the basis of one or more of the other indicators (the independent variables). Historical values for all variables are analyzed to determine the relationship between the independent and dependent variables. These relationships may be used, with the projected values of the independent variable(s), to project corresponding values of the dependent variable.

Market share analysis involves an historical review of the activity at an airport as a percentage share of a larger aviation market. The local share-of-the-market factor is multiplied by forecasts of the larger market for a projection. This top-down approach can prove useful as a check on the validity of projections based on other techniques.

Another forecasting technique is to review and consider the forecasts made by other agencies. Although these agencies often utilize different data bases and variables, they generally use the same general techniques for forecasting aviation activity. The review of other forecasting efforts can assist in making subjective judgments concerning short-term forecast trends.

These forecasting techniques are used to develop projections for several key aviation activity indicators, such as based aircraft, aircraft fleet mix, aircraft operations and peaking characteristics.

In the selection of a preferred forecast, several other intangible factors should be weighed.

- Uses for which the forecast is being developed.
- Character of the surrounding community and service area.
- Potential changes in the regional economic environment.
- State-of-the-art advances in aviation related technology.
- Impact of new facilities or improved services.
- Policies of the airport owner and operator.
- Airport's changing role within the aviation system.

While one cannot assume a high level of confidence in forecasts that extend beyond five years, more than five years of forecasts are often needed to complete a facilities development program, and at least twenty years is necessary to adequately amortize most capital improvements. For this reason, the planning results should be flexible in order to respond to unanticipated deviation from the forecasts.

TRENDS AT THE NATIONAL LEVEL

Each year the FAA publishes a national forecast of aviation activity. Included in these projections are categories for air carriers, air taxi/commuters, general aviation, and military activity. The forecasts are prepared to meet budget and planning needs of the FAA and to provide information that can be used by state and local authorities, the aviation industry and the general public.

The current edition of the *FAA Aviation Forecasts, Fiscal Years 1994-2005*, was used as a basis for the development of a series of forecasts for Springerville Municipal Airport. A synopsis of both existing and anticipated future conditions in the aviation industry, as

provided in the FAA report, is presented in the paragraphs that follow.

The general aviation industry is an important contributor to the nation's economy. General Aviation (GA) includes the production and sale of aircraft, avionics and other equipment, along with the provision of support services such as flight schools, fixed base operators, finance and insurance. The single engine piston aircraft market is the base on which GA activity builds. New pilots are trained in single engine piston aircraft and work their way up through retractable landing gear and multi-engine aircraft to turbine (turbo) aircraft. When the single-engine piston market declines, it signals the slowing of expansion in the GA fleet and, consequently, a slowing in the rate of growth of activity at airports.

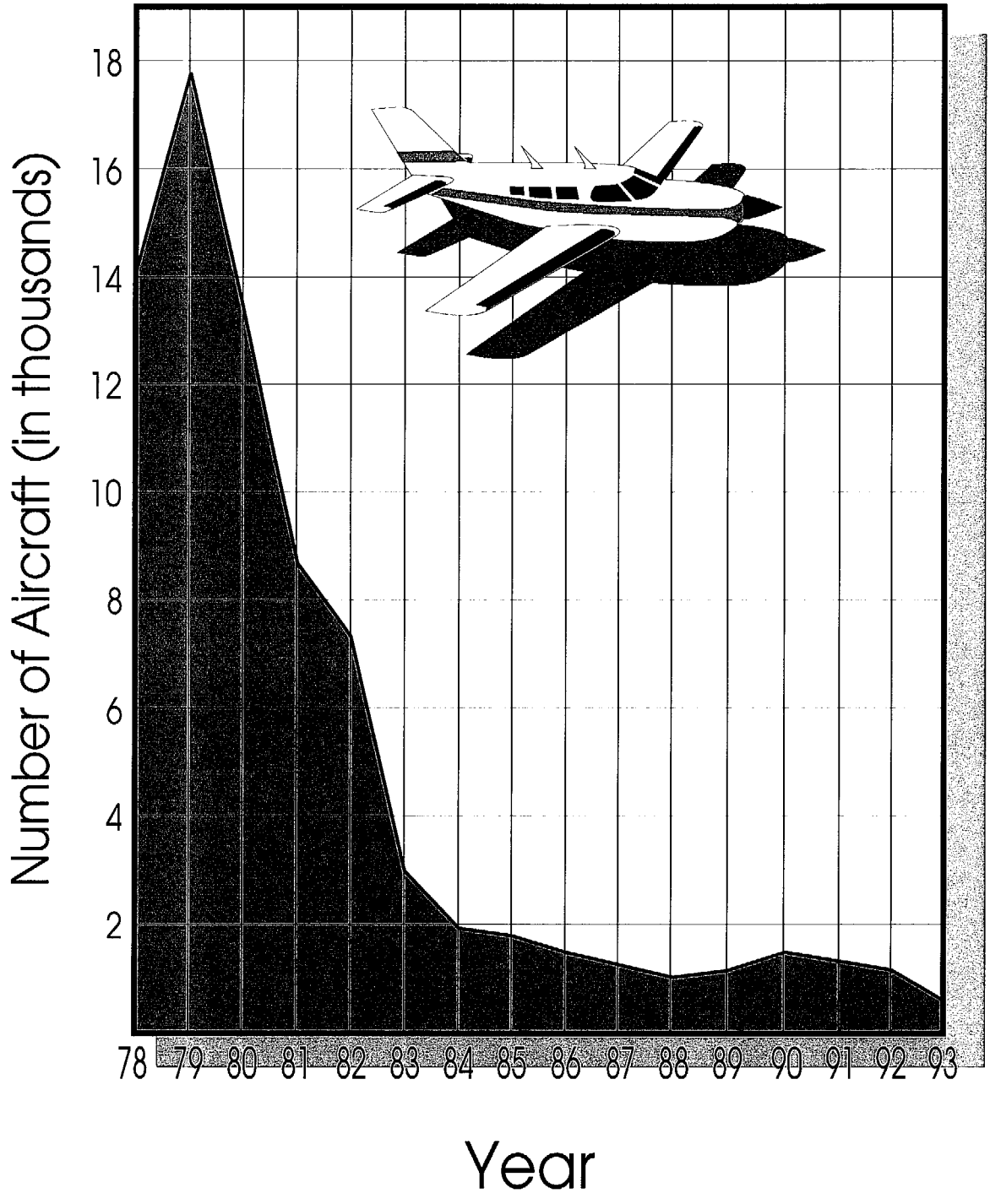
The total active general aviation fleet declined 13.5 percent between fiscal years 1984 and 1993, the most current information available. In 1984 the active general aviation fleet was comprised of a high of 213,300 aircraft. By 1993, the total number of active general aviation aircraft declined to 184,430. Single-engine piston aircraft declined from 154,100 in 1992 to 143,600 in 1993. The number of multi-engine piston aircraft also declined from 21,200 in 1992 to 18,600 in 1993. Between 1992 and 1993, the total number of turboprop aircraft declined by 200 (to 4,700) and the total number of turbojets declined by 400 aircraft (to 4,000). The numbers of rotorcraft (helicopters) also declined from 6,300 in 1992 to 5,800 in 1993.

Single-engine aircraft dominated the 1993 statistics comprising 84.1 percent of the fixed-wing fleet, but less than the 90.6 percent share they held in 1975. Multi-engine aircraft constituted 10.9 percent, turboprop aircraft 2.8 percent and turbojet aircraft 2.3 percent of the fixed-wing aircraft fleet. The percent share of the fixed-wing fleet of both the single-engine and turboprop aircraft represent an increase over their share in 1992 (83.5 and 2.6 percent respectively). The percent share of multi-engine and turbojet aircraft both represent a decline since 1992 (11.5 and 2.4 percent respectively).

In Fiscal Year 1993, the number of general aviation aircraft shipments totalled 811, down 8.8 percent from 1992 and 95.5 percent from 1979 (see **Exhibit 2A, General Aviation Aircraft Shipments**). Despite this overall decline, there were some positive trends. The shipment of Turboprop aircraft (207) was up 22.5 percent. Shipments of jet aircraft (168), while down a total of 12.5 percent, actually increased during the latter half of the year. Piston aircraft shipments (436), however, declined 17.4 percent in 1993.

The cost factors affecting general aviation indicate that a dramatic turnaround in general aviation statistics is not likely in the near future. As the cost of aircraft has continued an upward climb since 1975, total aircraft shipments have declined. Operating and maintenance costs, which appeared to level off in the early 1980's (even declining slightly during the period between 1985 and 1989), have increased over the last few years, affecting all classes of aircraft. The number of flying hours decreased in 1993 to 26.5 million hours from the 1992 level of 30.1 million hours. This decrease affected all aircraft types.

The FAA has found that general aviation forecasts do not follow "normal" trends or traditional economic variables. On the whole, general aviation did not respond to the economic recovery between 1982 and 1989, one of the most robust in the post-



SPRINGERVILLE AIRPORT

Exhibit 2A
GENERAL AVIATION AIRCRAFT
SHIPMENTS (1978 - 1993)

war period. Several factors have played a major role in this disparity, such as higher aircraft prices, interest rates, and product liability costs. The nominal cost of purchasing a single-engine aircraft increased 126 percent between 1978 and 1986 (the last year for which FAA has records). The cost of purchasing a multi-engine aircraft is up 230 percent, a turboprop: 207 percent and a turbojet: 186 percent, over the same period. Increases in product liability costs were one of the key factors responsible for the large increases in the purchase price. According to the FAA, over the last ten years, annual claims paid by manufacturers have increased from $24 million to over $210 million, despite an improved safety record. On the other hand, operating costs, which had previously been considered a factor, have actually declined since the early 1980's.

The deregulation of the commercial airline industry has also affected general aviation; increased service and better connections have reduced the demand for private flights to destinations served by commercial airlines. In 1979, only about 9,000 markets received single carrier service; in 1993, 21,000 markets were so served. Commercial carriers are in the process, however, of restructuring and or rationalizing their entire route systems, and are either reducing or discontinuing service at many of the secondary hubs established in the 1980's. Much of this service is expected to be replaced by regionals and commuters. The impact of this on the general aviation market is, as yet, unknown.

REASONS FOR OPTIMISM

The FAA, however, does note that there are reasons to be optimistic regarding the future of general aviation. One of the key reasons behind this optimism is the 1994 adoption of the General Aviation Revitalization Act, which limits product liability on general aviation aircraft manufacturers to 18 years from the date of manufacture. The general aviation industry has indicated that passage of this legislation would not only lower their insurance cost, but would also allow manufacturers to begin to design and produce new technology and cheaper aircraft. Both the FAA and NASA are collaborating with the general aviation community to implement a research program to bring new technologies to general aviation.

Other reasons to be optimistic are the growth in amateur-built airplanes, the continued strength of the used aircraft market and the continued demand for new piston aircraft. Combined, these indicate that there remains a strong market for general aviation aircraft. Also, although total GA activity at FAA towered airports has declined substantially in the past 15 years, it has increased over 9.0 percent at nontowered airports. This may be directly related to the increase in commercial air carrier activity at the towered airports.

FAA GENERAL AVIATION FORECASTS

The active general aviation fleet is expected to decline slightly (down 0.3 percent annually) during the 12-year forecast period. Most of the decline in piston aircraft is expected to occur in the early years, in large part due to the retirement and/or shifts to nonactive status of many of the older aircraft in the fleet. After 1998, the gap caused by these retirements is expected to be filled by the manufacture of newer technology aircraft. Between 1993 and 1998, the number of active single-engine aircraft are expected to decline from 143,580 to 131,100 and then remain constant (81.8 percent of the fixed-wing

fleet in 2005). The number of multi-engine piston aircraft are expected to decline from 18,536 in 1993 to 17,300 in 1998, after which they are expected to increase to 17,600 in 2005 (11.0 percent of the fixed-wing fleet).

The active turbine-powered fleet is expected to grow by 2.4 percent annually throughout the 12-year planning period, largely as the result of an expanding U.S. economy. The number of turboprop aircraft is expected to grow from 4,704 in 1993 to 6,500 in 2005 (4.1 percent of the fixed-wing fleet). The number of turbojets are expected to increase from 4,022 in 1993 to 5,100 in 2005 (3.2 percent of the fixed-wing fleet).

Although the active general aviation fleet is expected to decline slightly, the number of hours flown is expected to increase by an average of 1.0 percent annually over the 12-year forecast period. Turbine-powered helicopters are expected to experience the greatest increase, growing at an average annual rate of 4.9 percent. This is followed by turbine-powered aircraft with a projected 4.8 percent average annual growth rate and multi-engine piston aircraft with a 1.1 percent average annual growth rate. Single-engine piston aircraft hours are expected to decrease by an average annual rate of 0.5 percent.

The pilot population is also anticipated to increase with most of the growth coming in the number of airline pilots needed to meet the growing demand for scheduled service (2.6 percent annually). The private pilot population is expected to grow at a more modest rate of 0.3 percent annually. Reflecting the increased sophistication of both aircraft and their pilots, more pilots were instrument rated in 1992 than ever before (44.8 percent).

OTHER INDICATORS

A recent article in *Airport Magazine* ("The Future of General Aviation: Renaissance or Repeat," September/October 1994), provided some additional optimism for growth of the general aviation market. In addition to those mentioned above, including the passage of the General Aviation Revitalization Act and the new production of single-engine piston aircraft, the article indicated that the general aviation sector may experience a resurgence as a result of a combination of economic growth and new programs designed to stimulate the use of aircraft for both business and pleasure. The article discussed the National Business Aircraft Association (NBAA) and General Aviation Manufacturers Association (GAMA) joint program highlighting the benefits of business use of GA aircraft, called "No Plane, No Gain." The Aircraft Owners and Pilots Association (AOPA) also has a program, "Project Pilot," designed to increase the number of pilots. Within the first three months of implementation, this program attracted over 4,000 new student pilots.

The author of the article, John J. Smith, interviewed a number of airport managers of successful GA airports to find out why their airports did so well while, as a whole, GA airports were declining. He concluded that successful airports benefitted from generally strong financial support, a strong educational program (e.g. pilot training schools and participation in Project Pilot) and good regional economic growth.

DEFINITION OF SERVICE AREA

The initial step in determining aviation demand is to define the geographic area served by the airport. The airport service area is determined primarily be evaluating the location of competing airports, their capabilities and services, and their relative attractiveness and convenience. It should be recognized that aviation demand does not necessarily conform to political or geographic boundaries.

The airport *service area* is an area where there is a potential market for airport services. Access to general aviation airports, commercial service and transportation networks enter into the equation that determines the size of a service area, as well as the quality of aviation facilities, distance and other subjective criteria.

In determining the aviation demand for an airport it is necessary to identify the role of that airport. In the past, the primary role of Springerville Municipal Airport has been to serve the general aviation needs in the Springerville/Eager area, which includes the communities of Alpine, Greer and Nurtroso, and parts of Western New Mexico. Potential commercial (commuter) service use of the airport would expand the service area to include St. Johns.

POPULATION PROJECTIONS

Many aviation factors such as based aircraft, aviation demand and passengers, are influenced by population statistics. For this reason, the historical demographics of the Springerville/Eager area and Apache County were examined for use in forecasting aviation factors for Springerville Municipal Airport.

The 1980 and 1990 population estimates for the combined Springerville and Eager incorporated area and Apache County were reviewed to determine the percent change over the ten year period. The results of the analysis indicated that the combined population of Springerville and Eager increased by over 37 percent and the population of the County increased by 18 percent.

Population estimates for the service area were derived from the 1990 U.S. Census and the Arizona Department of Economic Security population projections. The projections for the Eager-Springerville and Fort Apache Divisions of the County Census County Division and Place projections were used to determine the General Aviation Service Area. The Air Taxi/Commuter Service Area also includes the St Johns County Division. The 1990 population and the population projections for the aviation forecast years are presented in **Table 2A, Population Projections.**

TABLE 2A
Population Projections

Year	Springerville/ Eager	General Aviation Service Area	Air Taxi/ Commuter Service Area	Apache County
1990	5,827	7,503	7,503	61,591
FORECAST				
1995	6,607	8,088	8,088	66,395
2000	7,095	8,683	11,737	71,278
2005	7,672	9,390	15,386*	77,080
2010	8,365	10,240	16,778*	84,055
2015	9,160	11,212	18,371*	92,034
Annual Average Growth Rate	1.65%	1.65%	1.65%	1.65%

NOTE: * Includes the St. Johns Census County Division.
SOURCES: Northern Arizona Council of Governments.
Arizona Department of Economic Security.

GENERAL AVIATION DEMAND

General aviation is defined as that portion of civil aviation which encompasses all facets of aviation except commercial and military operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include the following.

- Based Aircraft.
- Based Aircraft Fleet Mix.
- Aircraft Operations.
- Peaking Characteristics.

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft, the growth of the other indicators can be projected. In the case of Springerville Municipal Airport, based aircraft was defined to include the seven aircraft currently parked on private property immediately off the airport. The two aircraft owners have been provided through-the-fence access to the airfield. The rationale behind the general aviation activity forecast is presented as follows.

PROJECTED BASED AIRCRAFT

To assess its value in the development of based aircraft forecasts, available historical data on registered/based aircraft for the State of Arizona, Apache County and Springerville Municipal Airport were gathered and evaluated. While a fairly complete record of historical based aircraft is available for the State as a whole and for Apache County, historical data for Springerville Municipal Airport is incomplete and may be incorrect for some

of the years available. The historical based aircraft data for the airport was obtained primarily from a limited number of *FAA 5010 Forms* and the *FAA's National Plan of Integrated Airport Systems* which are not always consistent with each other, as is the case regarding Springerville Municipal Airport. Due to this incomplete and unreliable record, the use of this data to establish historical trends would not prove meaningful.

Trendline and Linear Regression Analysis

The trendline and linear regression analysis methodologies were reviewed for projecting future based aircraft at Springerville Municipal Airport. Due to the limited amount of reliable historical data for the airport, this technique did not result in a credible representation of future based aircraft and necessitated the use of other forecasting techniques.

Market Share Analysis

A market share analysis was one of the methods used to project the number of based aircraft at Springerville Municipal Airport. The market share method considers the existing and historical percentage of airport-based aircraft to the total registered aircraft in some larger market.

For the Springerville Municipal Airport forecasting effort, the number of based aircraft at the airport was compared to the total number of aircraft registered within Apache, Coconino and Navajo Counties. While it would be more common to base a market share analysis on one county, in this case, the only future forecasts of registered aircraft for Apache County were combined with Coconino and Navajo Counties. **Table 2B, Historical/Forecast Registered Aircraft – Apache, Coconino and Navajo Counties,** provides both historical and forecast registered aircraft for the tri-county region. The forecasts of registered aircraft for compiled in 1988 as part of the *Arizona State Aviation System Plan (SASP).*

TABLE 2B
Historical Forecast Registered Aircraft Apache, Coconino and Navajo Counties

Year	Total
Historical	
1975	251
1976	265
1977	306
1978	370
1979	388
1980	402
1981	397
1982	398
1983	419
1984	421
1985	438
1986	367
1987	363
1988	N/A
1989	N/A
1990	N/A
1991	257[2]
1992	250[2]
1993	232[2]
1994	234[2]
1988 SASP Forecast[1]	
1995	478
2000	537
2005	596
2010	656
2015	722[3]

NOTE: N/A - Not Available
SOURCES: [1] 1988 Arizona State Aviation System Plan (SASP)
[2] ADOT, Aeronautics Division
[3] Value extrapolated by Coffman Associates, Inc.

The forecasts for the tri-county area were based on the historical growth in registered aircraft between 1975 and 1985. Since then, however, the total number of registered aircraft within this area has been in decline. In consideration of the current total of 234 aircraft, the SASP forecast of 478 for 1995 would represent almost a doubling of aircraft over the next year and would be considered highly unlikely. For this reason, any forecast prepared based on these SASP projections of registered aircraft must be viewed cautiously.

Due to the incompleteness and inaccuracy of historical based aircraft both at the airport and in the tri-county area, establishing Springerville Municipal Airport's share of the tri-county market was based on data for the year 1994. The results of this analysis indicate that Springerville Municipal Airport comprises approximately 12 percent of the larger, tri-county market. This percentage was then applied to the forecast years based aircraft for the tri-county region in order to determine Springerville's market share. **Table 2C, Forecast of Based Aircraft,** illustrated on **Exhibit 2B, Based Aircraft Forecast,** provides the results of this market share forecast.

Based Aircraft Per Population Ratio Analysis

Another forecasting technique used was the ratio of based aircraft to population. In this technique, the ratio of based aircraft per 1,000 population is applied to population forecasts for the Springerville/Eager area and the Springerville Municipal Airport general aviation service area.

The number of based aircraft per 1,000 population for the Springerville/Eager area has averaged 4.59 for the last four years (1991-1994). Applying this ratio to population forecasts for the two towns projects 31 aircraft based at the airport by the year 1995, and an increase over the planning period to 42 by 2015, as presented in **Table 2C.**

A ratio of population forecast was also completed based on population of the airport's general aviation service area. The ratio of based aircraft at Springerville Municipal Airport to the population of the airport's service area was determined to be 3.57, based on the years 1993 and 1994. The resulting population ratio forecast, presented in **Table 2C,** ranged from 29 aircraft in 1995 to 40 aircraft by the year 2015.

Other Forecasts

Forecasts available for Springerville Municipal Airport through other planning sources include the FAA's National Plan of Integrated Airport Systems (NPIAS), 1990-1999, and the 1988 SASP, prepared by ADOT. In addition, forecasts for the airport were developed as part of the previous Airport Master Plan, completed in 1987. The results of each of these studies are reported in **Table 2C.**

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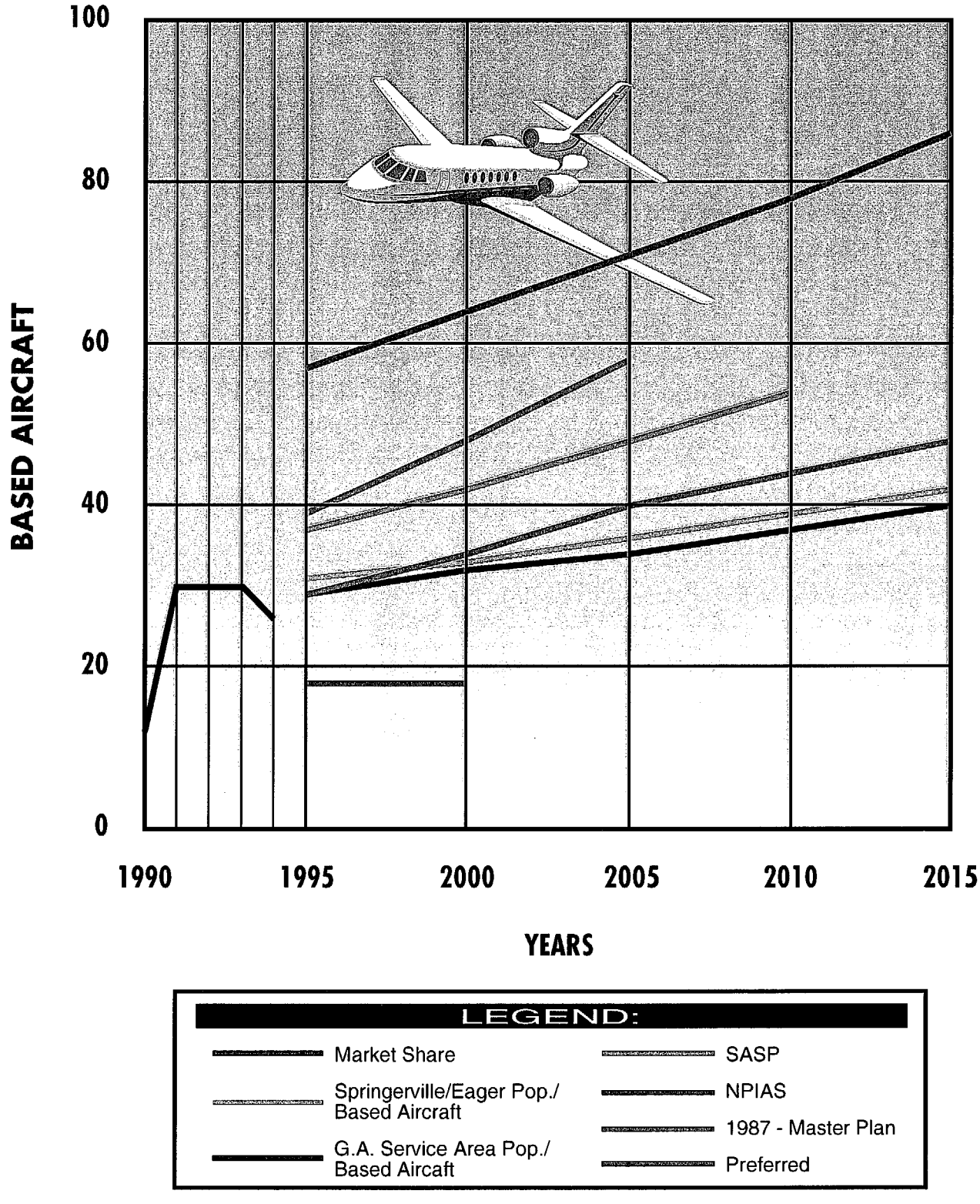

SPRINGERVILLE AIRPORT

Exhibit 2B
BASED AIRCRAFT FORECAST

TABLE 2C
Forecast of Based Aircraft
Springerville Municipal Airport

	1995	2000	2005	2010	2015
Market Share of					
Apache, Coconino and Navajo Counties' Registered Aircraft	57	64	71	78	86
Based Aircraft per 1,000 Population					
Springerville/Eager	31	33	36	39	42
GA Service Area	29	32	34	37	40
Other Studies					
1988 Arizona SASP	37	42	48	54	N/A
1990-1999 FAA NPIAS	18	18	N/A	N/A	N/A
1987 Master Plan	39	48	58	N/A	N/A
Preferred Forecast	**29**	**34**	**40**	**44**	**48**

Preferred Based Aircraft Forecast

In selecting a preferred forecast for based aircraft, the following considerations were made. The forecasts based on the market share of Apache, Coconino and Navajo Counties, the 1988 Arizona SASP and the 1987 Master Plan were all considered optimistic, while the FAA NPIAS estimates were determined to be overly conservative.

The ratio of based aircraft to the population of the Springerville/Eager area and the Springerville Municipal Airport's general aviation service area were both considered to be realistic over the immediate future. Due to the increasing tourist and business activity in the area, however, which would be expected to increase local population, these forecasts may be conservative over the long-term.

The preferred forecast of based aircraft for Springerville Municipal Airport is included in Table 2C.

BASED AIRCRAFT FLEET MIX

The type of aircraft expected to use the airport must be projected in order to properly size airport facilities. The existing based aircraft fleet mix at Springerville Municipal Airport consists of 24 single-engine and two (2) twin-engine piston aircraft. The overall trend in general aviation is toward a slightly higher percentage of larger, more sophisticated aircraft. A similar trend is expected to occur at Springerville Municipal Airport over the planning period. **Table 2D, Based Aircraft Fleet Mix**, provides the mix of existing based aircraft (1994) and the mix of based aircraft forecast for the planning period.

TABLE 2D
Based Aircraft Fleet Mix
Springerville Municipal Airport

Year	Single Engine	Multi Engine	Turbo Prop	Jet	Rotor	TOTAL
1994	24	2	0	0	0	26
FORECAST						
1995	26	3	0	0	0	29
2000	29	4	1	0	0	34
2005	33	5	1	0	1	40
2010	35	6	2	0	1	44
2015	36	7	3	1	1	48

AIRCRAFT OPERATIONS

An airport operation is defined as any takeoff or landing performed by an aircraft. There are two types of operations at an airport: local and itinerant. A local operation is a takeoff or landing performed by an aircraft that operates in the local traffic pattern, within sight of the airport, and includes the execution of simulated approaches and touch-and-go operations. Local operations are typically associated with training operations. Itinerant operations are those performed by an aircraft with a specific origin or destination away from the airport.

Without an Air Traffic Control Tower (ATCT) at the airport to monitor aircraft operations, operational levels can only be estimated. The historical aircraft operational data for the airport were obtained primarily from a limited number of FAA 5010 Forms. Operations estimates for 1994 were determined based on the results of a air traffic monitoring period, discussed below. As with based aircraft data, the record of estimated historical aircraft operations is incomplete and appears to be incorrect for some of the years available. The use of this data to establish historical trends would not prove meaningful.

Aircraft Activity Count

A sample of aircraft operational activity at Springerville Municipal Airport was obtained by utilizing a Rens Model ACC-10 Aircraft Activity Counter during a four week period from late July through August. This acoustically activated counter automatically collects and stores information on aircraft activity on both magnetic tape and digital counter. The tapes were then reviewed to determine the number and type of aircraft using the airport during the monitoring period.

Table 2E, Daily Takeoff Activity Summary, presents the daily activity monitored at the airport during the period of July 21 through August 19, 1994. By determining the average number of departures per day, 10.12, and establishing a sampling error at the 95 percent confidence level, the total number of annual operations conducted at Springerville Municipal Airport was estimated to be approximately 7,400.

TABLE 2E
Daily Takeoff Activity Summary
Springerville Municipal Airport

Date	Day	Total Takeoffs	Peak Hour Takeoffs	Peak Hour
July 21[1]	Thursday	3	1	*
July 22	Friday	13	7	7:00 am
July 23	Saturday	6	2	2:00 pm
July 24	Sunday	8	2	*
July 25	Monday	10	2	*
July 26	Tuesday	32	12	12:00 pm
July 27	Wednesday	13	4	4:00 pm
July 28	Thursday	7	2	4:00 pm
July 29	Friday	7	2	12:00 pm
July 30	Saturday	10	2	*
July 31	Sunday	7	2	12:00 pm
August 1	Monday	7	2	*
August 2	Tuesday	16	5	11:00 am
August 3	Wednesday	5	1	*
August 4	Thursday	6	2	4:00 pm
August 5	Friday	7	2	6:00 pm
August 6	Saturday	11	2	*
August 7	Sunday	10	4	8:00 am
August 8	Monday	10	2	9:00 am
August 9	Tuesday	9	3	4:00 pm
August 10	Wednesday	20	5	8:00 am
August 11[1]	Thursday	8	2	*
August 12	Friday	-	N/A	N/A
August 13	Saturday	-	N/A	N/A
August 14	Sunday	-	N/A	N/A
August 15	Monday	-	N/A	N/A
August 16	Tuesday	-	N/A	N/A
August 17	Wednesday	10	3	12:00 pm
August 18	Thursday	6	2	*
August 19[1]	Friday	3	1	*
TOTALS	22 Days[2]	230 Takeoffs	2.96 Average	N/A
ESTIMATED TOTAL ANNUAL OPERATIONS = 7,400[3]				

NOTES:
[1] Partial Day
* More than one peak hour
[2] Partial days not included
[3] ±1,050 operations at 95 percent confidence level, without adjusting for seasonal variations.

Using the average annual operational level determined above, 7,400, the average monthly operations were calculated to be 617 and the average daily operations to be approximately 21. **Table 2F, Day-of-the-Week Activity Summary**, summarizes the activity data obtained during the airport activity count.

TABLE 2F
Day-of-the-Week Activity Summary
Springerville Municipal Airport

Day	# of Days	Total Takeoffs	Total Operations	Average Daily Operations	Percentage of Week
Sunday	3	25	50	16.68	10.9%
Monday	3	27	54	18.00	11.7%
Tuesday	3	57	114	38.00	24.8%
Wednesday	3	48	96	32.00	20.9%
Thursday	3	19	38	12.67	8.3%
Friday	4	27	54	13.50	11.7%
Saturday	3	27	54	18.00	11.7%
Totals	**22**	**230**	**460**	**21.26**	**100.0%**

According to airport fuel records for the period prior to monitoring, the Springerville Municipal Airport was significantly busier than the period of monitoring. This was largely due to the change in weather (on-set of the monsoon season) which reduced the number of operations by both the U.S. Forest Service and tourists. Adjusting the calculated operational level for seasonal variations, the annual operational level at Springerville Municipal Airport was determined to be approximately 9,300 operations.

Trendline and Linear Regression Analysis

The trendline and linear regression analysis methodologies were reviewed for use in projecting future aircraft operations at Springerville Municipal Airport. Because the operational data available is limited to estimates only and fluctuated from year-to-year, this forecasting technique did not result in a credible representation of future based aircraft and necessitated the use of other forecasting techniques.

Operations Per Based Aircraft

Traditionally, the number of general aviation operations has closely correlated with the number of based aircraft at an airport. In other words, the more aircraft based at an airport, the more aircraft operations are logged. Airports with a large training enterprise typically log more operations per based aircraft than those airports which do not have a training facility.

Based on information from other general aviation airports, an airport the size of

Springerville Municipal Airport can expect to generate from 200 to 500 annual operations for every based aircraft. **Table 2G, General Aviation Operations Forecast,** illustrates the operations per based aircraft forecast using a high (500) and low (200) value for annual operations per based aircraft.

TABLE 2G
General Aviation Operations Forecast
Springerville Municipal Airport

	1995	2000	2005	2010	2015
Operations per Based Aircraft					
200 Ops/Based Aircraft	5,800	6,800	8,000	8,800	9,600
500 Ops/Based Aircraft	14,500	17,000	20,000	22,000	24,000
Other Studies					
1988 Arizona SASP	19,959	23,283	27,160	31,682	N/A
1990-1999 FAA NPIAS	10,000	12,000	N/A	N/A	N/A
1987 Master Plan	20,500	25,000	30,500	N/A	N/A
Preferred Forecast	**10,440**	**13,600**	**17,600**	**19,800**	**22,100**

Preferred Forecast

The operations estimates from the *1988 SASP* and the *1987 Master Plan* were not considered further for the same reason as provided in the discussion of based aircraft; they were considered too optimistic.

In consideration of the 1994 operations estimate for Springerville Municipal Airport (9,300), forecasts based on 200 operations per based aircraft would appear to be low. On the other hand, 500 operations per based aircraft indicates a higher percentage of training and business/recreational activity than what currently occurs at the airport. For these reasons, a third value of operations per based aircraft was used to project future operational levels and was selected as the preferred forecast. Over the short-term the number of operations per based aircraft is expected to remain below 400, but is expected to increase to 460 as the economic development of the Springerville/Eager area grows.

Local Versus Itinerant Operations

With the lack of an ATCT, no definitive data exists regarding the split of itinerant to local airport operations at Springerville Municipal Airport. The Fixed Base Operator estimates that touch-and-go activity currently accounts for 20 percent of total operations at the airport, the majority of which occur on the weekend.

Over the planning period, this percentage is expected to grow very little, increasing to only 25 percent of the total operations by the year 2015. Use of the airport for business and recreational activities is expected to increase; however, little of this new activity is expected to be training related. Given the Springerville Municipal Airport's distance from other airports with

large training schools, it is not expected to be heavily used for touch-and-go operations. Table 2H, General Aviation Operations Forecast: Local Versus Itinerant, provides the number of projected local versus itinerant operations for Springerville Municipal Airport based on the anticipated change in operational split.

TABLE 2H
General Aviation Operations Forecast: Local Versus Itinerant
Springerville Municipal Airport

	1995	2000	2005	2010	2015
Local	2,100	2,900	4,000	4,700	5,500
Itinerant	8,340	10,700	13,600	15,100	16,600
Total	**10,440**	**13,600**	**17,600**	**19,800**	**22,100**

AIR TAXI/COMMUTER ACTIVITY

The air taxi/commuter category is a subcategory of general aviation and includes scheduled commuter and on demand charter service, as well as all other aircraft "...carrying passengers, mail, or cargo for compensation or hire." Both on-demand air taxi and charter services are expected to continue at Springerville Municipal Airport and are likely to expand over the course of the planning period. Given the remoteness of the region to major population centers and hub airports (i.e. Phoenix and Albuquerque), as the Springerville/Eager and St. Johns region becomes more popular as a tourist destination and business location, more travellers will seek to access the area via scheduled air services.

The designation of the Casa Malpais ruins as either a National Park or Affiliate, the proximity of the area to other major recreation areas, such as the Petrified National Forest and the Sunrise Ski Resort, and the increasing use of the Apache-Sitgreaves National Forest as a hunting, fishing and camping area all indicate that the Springerville Municipal Airport is located in an area of expanding, four-season, recreational use. This is expected to result in an increase in Service sector employment in the area. In addition, the initial response to the region's actions to promote economic development of the area, through the formation of ACES and the provision of incubator sites, indicate the area is likely to experience an upsurge in manufacturing and related employment.

The airport's FBO estimates current air taxi operations as between 75 and 100 operations per month, for an average of 1,050 annual operations. (No specific numbers are available because the airport is not equipped with an ATCT.) This constitutes approximately 11.3 percent of the total general aviation operations at Springerville Municipal Airport for the year 1994.

As the population and popularity of the service area increases over the planning period, it is expected that the number of people served by air taxi/commuter will also increase. Over the short-term (1995-1999), the local passenger transportation needs are expected to be met through individually contracted flights. Over the long-term, however, demand is expected to

increase and scheduled commuter service may be anticipated.

The number of projected air taxi and commuter operations can be determined by applying an average ratio of passenger enplanements per departure. (Enplaning passengers are those who board an aircraft for departure from the airport.) The estimates of passenger enplanements were calculated based on the number of enplanements per 1,000 population. In 1994, there were approximately 130 enplanements per 1,000 population in the Springerville Municipal Airport's General Aviation Service Area. As the airport is used for more business and pleasure travel, this factor is expected to grow to 200 over the planning period. When scheduled commuter service begins at the airport, it is expected that the service area will increase as people in the St. Johns area take advantage of the available service.

Table 2J, Forecast Enplanements and Air Taxi/Commuter Operations provides the results of the air taxi/commuter forecasting effort. The operations numbers will be separated from those of General Aviation in the final summary table, located at the end of this chapter. While the service area population and annual enplanements are expected to increase significantly over the 20-year planning period, the number of operations do not. It is expected that as demand for air taxi/commuter service increases, the passenger capacity of the aircraft used will also increase, allowing for a more economical use of aircraft and fuel.

TABLE 2J
Forecast Enplanements and Air Taxi/Commuter Operations
Springerville Municipal Airport

	1995	2000	2005	2010	2015
Service Area Population	8,088	11,737	15,386	16,778	18,371
Annual Enplanements	1,050	1,650	2,450	3,000	3,700
Annual Departures	500	590	700	720	760
Annual Air Taxi Commuter Operations	1,000	1,180	1,400	1,440	1,520

U.S. FOREST SERVICE

The U.S. Forest Service currently accounts for five percent of total aircraft operations at Springerville Municipal Airport. They utilize the airport as a base for one of their Smoke Jumpers firefighting units. The White Mountain Dispatch Office provides support work out of Springerville beginning in February and running through Thanksgiving. The majority of their operations, however, occur between mid-April and mid-August, corresponding to the local critical fire season. The Forest Service estimates that of their 430 operations a year, two-thirds are performed by twin-engine piston aircraft, the remainder are by helicopters, turboprops and single-engine piston aircraft. Aircraft used by the Forest Service include: twin otters; modified DC-3's; Cessna 337, 206, 414, and 421's; Beech King Air and Queen Air's; and a variety of Bell helicopters (204's, 205's, 206's, 212's, and 214's).

The current estimate of annual operations by the Forest Service is 430 operations. Provided adequate facilities are available at Springerville Municipal Airport, it is forecast that this will increase slightly to 500 operations by the end of the planning period. These operations are expected to all be itinerant and, because they are performed by general aviation-type aircraft, are included in the general aviation forecasts (Table 2G).

PEAKING CHARACTERISTICS

Many airport facility needs are affected by the levels of activity during peak periods. In the consideration of peaking characteristics, the following indicators are quantified.

- **Peak Month** - The Peak Month represents the level of activity that would occur within the busiest month of the year.

- **Design Day** - The Design Day is defined as the average day in the Peak Month. For general aviation activity, this indicator is easily derived by dividing the Peak Month operations by the number of days in the month.

- **Busy Day** - The Busy Day is defined as the busiest day of a typical week in the Peak Month. This indicator is used primarily to determine ramp space requirements.

- **Design Hour** - The Design Hour is considered the peak hour within the Design Day. This indicator is used particularly in airfield demand/capacity analysis, as well as in determining terminal building and access road requirements.

It is important to note that only the Peak Month is an absolute peak within a given year. All the others will be exceeded at various times during the year. These values represent reasonable planning standards that can be applied to airport plans to help identify the appropriate size and capability of the facility.

GENERAL AVIATION PEAKING CHARACTERISTICS

Design Hour Operations

While no monthly records of aircraft activity are available for Springerville Municipal Airport, monthly fuel sales information is available. It can be assumed that the percentage of annual fuel sales correlates directly to the percentage of annual operations at a given airport.

Based on information provided by Aerocrafter, June and July provide almost 50 percent of total annual fuel sales at the airport. This significant number is largely the result of the Jet A fuel requirements of the Forest Service. The Forest Service, however, accounts for less than five percent of the total operations at the airport, resulting in a significant skew. In order to reduce this skew, only AvGas fuel sales were considered in determining the peak month. The Peak Month at Springerville Municipal Airport was assumed to be June with 17.11 percent of total annual fuel sales and, therefore, total annual operations.

The Design Day, also called the average day of the Peak Month, will vary from year to year depending on the number of operations during the Peak Month (June). Dividing the value of the Peak Month (June) by the 30 days in the month yields the Design Day.

Typically, the Busy Day operations for a general aviation airport will run ten (10) to 20 percent greater than an average day. Consistent with activity characteristics for general aviation airports, the busy day operations factor has been assumed to be 15 percent more than the average day, or 115 percent of Design Day activity. This peaking factor has been projected to remain constant throughout the planning period.

Design Hour operations are used to establish the peak hourly demand affecting airfield and terminal facilities. Design Hour operations at general aviation airports generally range between 10 and 15 percent of the average day depending on the total activity. The Design Hour activity at Springerville Municipal Airport has been projected to remain constant at 12.5 percent throughout the planning period.

The peaking characteristics, which were applied to the forecast annual general aviation operations to obtain future peak operations at Springerville Municipal Airport, are presented in **Table 2K, General Aviation Peaking Characteristics.**

Design Hour Pilots and Passengers

The definition of general aviation passenger refers to the average number of pilots and passengers expected to utilize the airport's terminal facilities during a given time. To calculate the Design Hour Pilots and Passengers, an average of 2.0 passengers per operation was applied, beginning with 1.5 passengers per operation in the year 1995 and increasing to 2.5 by the end of the planning period. A summary of the general aviation peaking characteristics for the planning period is presented in Table 2K.

TABLE 2K
General Aviation Peaking Characteristics
Springerville Municipal Airport

	1995	2000	2005	2010	2015
Annual General Aviation Operations	9,440	12,420	16,200	18,360	20,580
Peak Month	1,615	2,125	2,772	3,141	3,521
Design Day	54	71	92	105	117
Busy Day	62	82	106	121	135
Design Hour	7	9	12	13	15
Design Hour Pilots and Passengers	11	16	24	29	38

AIR TAXI/COMMUTER PEAKING CHARACTERISTICS

Design Hour Operations

Peaking estimates for air taxi/commuter aircraft operations were assumed to be consistent with those for the remainder of general aviation aircraft, as described above.

Design Hour Passengers

To calculate the Air Taxi/Commuter Design Hour Passengers, an average of 5 passengers per operation was applied, beginning with 3.0 in the year 1995 and increasing to 7.0 by the end of the planning period. A summary of the air taxi peaking characteristics for the planning period is presented in **Table 2L, Air Taxi/Commuter and Total Peaking Characteristics.**

TABLE 2L
Air Taxi/Commuter and Total Peaking Characteristics
Springerville Municipal Airport

	1995	2000	2005	2010	2015
Air Taxi/Commuter					
Annual Air Taxi/Commuter Operations	1,000	1,180	1,400	1,440	1,520
Peak Month	171	202	240	246	260
Design Day	6	7	8	8	9
Busy Day	7	8	9	9	10
Design Hour	1	1	1	1	1
Design Hour Passengers	3	4	5	6	7
Total Peaking Characteristics (General Aviation and Air Taxi/Commuter)					
Total Annual Operations	10,440	13,600	17,600	19,800	22,100
Peak Month	1,786	2,327	3,012	3,387	3,781
Design Day	60	78	100	113	126
Busy Day	69	90	115	130	145
Design Hour	8	10	13	14	16

ANNUAL INSTRUMENT APPROACHES

Forecasts of annual instrument approaches (AIA) provide guidance in determining an airport's requirements for navigation aids. An instrument approach as defined by the FAA is "an approach to an airport with intent to land by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan when visibility is less than three miles and/or when the ceiling is at or below the minimum initial approach altitude."

Examination of weather records obtained for the Springerville/Eager area reveals that actual IFR weather conditions occur two percent of the year. By using the forecast operations for the planning period and a

factor of two percent of the total itinerant approaches, the number of AIA's can be projected for Springerville Municipal Airport (**Table 2M, Annual Instrument Approach Forecast**).

Since the FAA's definition of an instrument approach excludes those instrument approaches that do not occur during IFR conditions, actual instrument approaches can be higher, particularly at airports with a high percentage of training activity. With the low forecast of IFR activity, any requirement for navigational aids and/or instrument approach procedures would be based on factors other than weather, such as training capacity and overall safety.

TABLE 2M
Annual Instrument Approach Forecast
Springerville Municipal Airport

	1995	2000	2005	2010	2015
Itinerant Approaches	8,340	10,700	13,600	15,100	16,600
Total Annual Instrument Approaches	**167**	**214**	**272**	**302**	**332**

SUMMARY

This chapter has provided forecasts for those indicators of aviation demand that are essential to the effective analysis of future facility requirements at Springerville Municipal Airport. The next step in the master planning process is to assess the capacity of the existing facilities and to determine the size and quantities of various aviation facilities needed to keep pace with demand. For easy reference, **Table 2N, Aviation Forecast Summary, illustrated on Exhibit 2C, Total Forecast Aircraft Operations**, summarizes the results of previously reported forecasting results.

TABLE 2N
Aviation Forecast Summary
Springerville Municipal Airport

	1995	2000	2005	2010	2015
BASED AIRCRAFT					
Single Engine	26	29	33	35	36
Multi Engine	3	4	5	6	7
Turboprop	0	1	1	2	3
Turbojet	0	0	0	0	1
Rotorcraft	0	0	1	1	1
Total Based Aircraft	**29**	**34**	**40**	**44**	**48**
ANNUAL OPERATIONS					
Itinerant					
General Aviation	6,900	9,060	11,720	13,160	14,580
Air Taxi/Commuter	1,000	1,180	1,400	1,440	1,520
U.S. Forest Service	440	460	480	500	500
Local					
General Aviation	2,100	2,900	4,000	4,700	5,500
Total Annual Operations	**10,440**	**13,600**	**17,600**	**19,800**	**22,100**
Air Taxi/Commuter Enplanements	1,050	1,650	2,450	3,000	3,700
Annual Instrument Approaches	167	214	272	302	332

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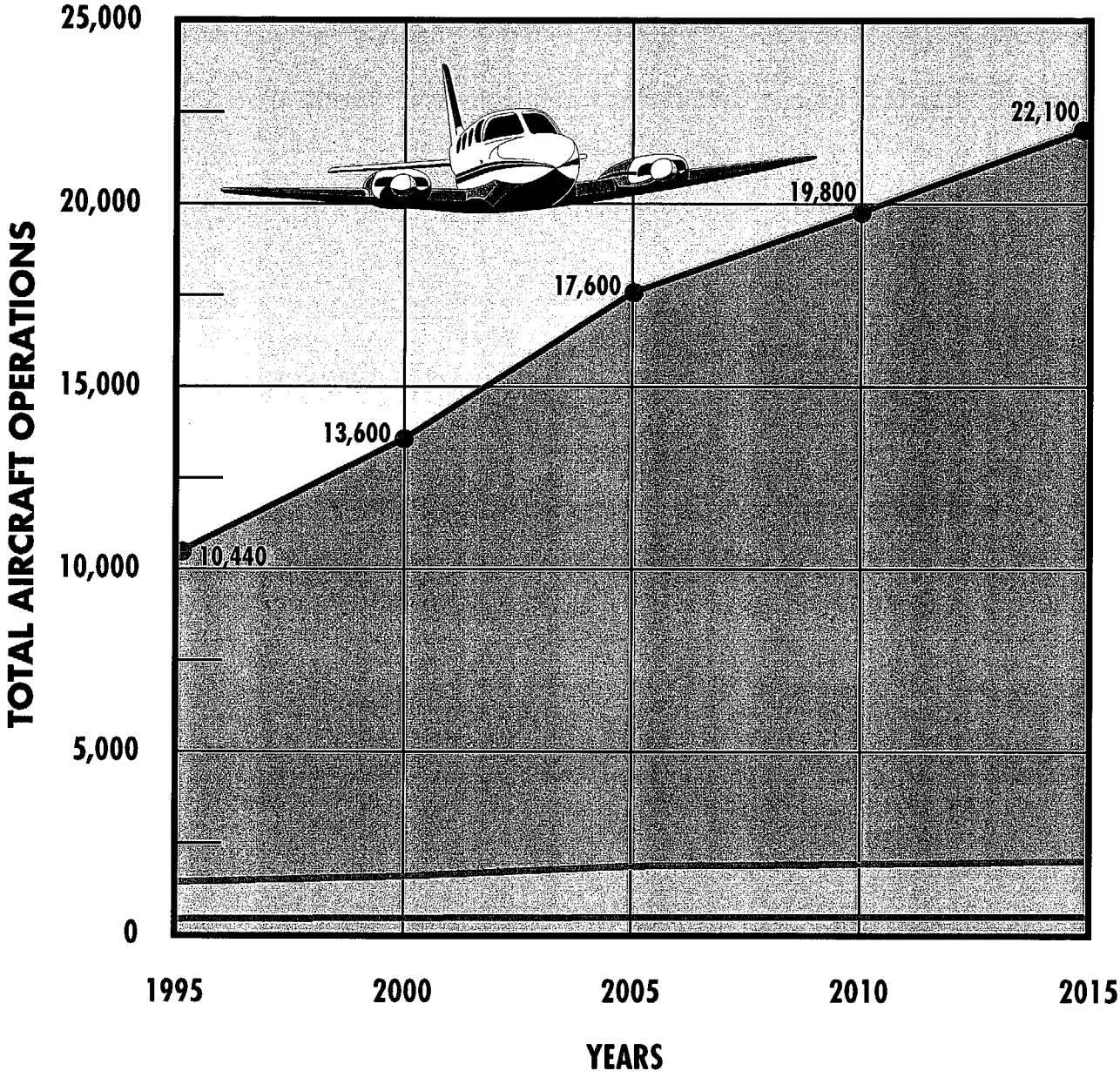

SPRINGERVILLE AIRPORT

Exhibit 2C
TOTAL AIRCRAFT OPERATIONS FORECAST